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Peregrine Falcon Surveys and Monitoring in the Northeast Boreal Region of Alberta, 2001

Alberta Species at Risk Report No. 57

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Peregrine Falcon Surveys and Monitoring in the Northeast Boreal Region of Alberta, 2001

Rob Corrigan

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EXECUTIVE SUMMARY

Historically, peregrine falcons (*Falco peregrinus anatum)* nested throughout Northeastern Alberta, along major river systems, Lake Athabasca and, in the Canadian shield north of Lake Athabasca. Indiscriminate use of the pesticide DDT during the 1950's and 1960's led to a decline of peregrine populations throughout north America. Peregrine falcons were extirpated in Alberta south of 58° and only a small remnant population remained in the Lake Athabasca area. Due to population declines, the peregrine was listed as "endangered" in Canada in 1971 and is currently listed as "threatened" in Alberta. Following the banning of DDT in Canada, wildlife managers began intensively managing peregrines, including the development of a captive-breeding facility.

Peregrines have been monitored annually in northern Alberta since 1971, and during this period the population has increased from a low of one territorial pair in 1973, to a high of 23, in 2000. During a provincial survey in the summer of 2000, it was found that there were 48 pairs of territorial peregrines in Alberta. Of the 48 pairs, 29 pairs were located in the Northeast region of Alberta. Four pairs were located on urban sites in the Edmonton area, and 25 pairs were located north of 58° in northeastern Alberta. Annual monitoring of all known nest sites in northern Alberta is logistically difficult due to the inaccessibility of many of the sites.

In 2001, it was agreed that Alberta Sustainable Resource Development (SRD), Wood Buffalo National Park (WBNP) and the Canadian Wildlife Service (CWS) would conduct annual occupancy and productivity monitoring in three study areas of northern Alberta. These study comprise a majority of the known nesting location in northeastern Alberta. SRD agreed to participate in annual monitoring of the Fort Chipewyan study area in conjunction with WBNP and CWS. This report presents results from surveys in the Fort Chipewyan and Edmonton area during summer 2001.

In 2001, there were ten occupied territories that produced twelve young in Fort Chipewyan. Nine young were banded at three nest sites as a component of this project. In the Edmonton area, there were six territorial pairs of peregrines that successfully fledged 16 young, of which seven were captive-raised foster young. Six pairs of peregrines represent the highest number of occupied territories in Edmonton, since they began nesting in Edmonton in 1981. Sixteen fledged young is also the greatest number of young fledged in any one breeding season. All sixteen young were banded for future identification and two young were known to have died following fledging.

It is recommended that SRD continue to participate in annual monitoring in the Fort Chipewyan study area and in the Edmonton area. This ongoing effort will allow wildlife managers to monitor population and productivity trends for recovery planning.

1.0 INTRODUCTION

Due to the widespread use and environmental accumulation of pesticide residues (DDT and its derivative DDE), the peregrine falcon (*Falco peregrinus anatum)* population declined throughout North America during the 1950's and 1960's (Peakall *et al.* 1990). Since 1970, Alberta has participated in a continent-wide census that occurs every five years. As a result of the population decline, the peregrine falcon was listed as an "endangered" species in Canada in 1971 (COSEWIC 2000). By 1975, the *anatum* sub-species of peregrine falcons was extirpated in southern Alberta, and only a small remnant population of breeding peregrines remained in northeastern Alberta (Fyfe *et al.* 1976).

Following the ban of DDT in Canada in 1969, wildlife managers initiated efforts to preserve the genetic diversity of native peregrine population by establishing a captive breeding facility. The Canadian Wildlife Service (CWS) removed peregrines from wild populations to be used as breeding stock, which would eventually supply captive-raised peregrines for release into the wild. Young falcons were released into the wild in northern Alberta through fostering and into southern Alberta through a combination of fostering and hack-releases. Through these reintroduction efforts, the population of peregrines in both northern and southern Alberta has increased from three occupied territories in 1970 (Cade and Fyfe 1970) to 48 known occupied territories in 2000 (Corrigan 2000). As a result of the population increase, the species was down-listed to "threatened" in Alberta in 2000 (ESCC 2000), which followed the down-listing nationally in 1999 (COSEWIC 2000).

Throughout the decline and subsequent recovery of peregrines in Alberta, annual monitoring has been an integral component of managing this species. Due to logistical restraints and limited access to a number of northern Alberta nesting sites, not all locations could be surveyed annually for occupancy and productivity. It was decided in 2000, by Alberta Sustainable Resource Development (SRD) Fish and Wildlife Division, Wood Buffalo National Park (WBNP) and CWS, that the northern population would be divided into three study areas, Fort Chipewyan, Fort Smith and Peace Point. These three study areas would be monitored annually for occupancy and productivity, known nesting locations outside these study areas would be monitored when possible. SRD in conjunction with WBNP would be responsible for annual monitoring for the Fort Chipewyan study area. In addition to the Fort Chipewyan nest sites in northeastern Alberta, SRD continues to annually monitor the population of peregrines that breed in the Edmonton area on manmade structures.

Historically, there were twelve known peregrine nesting locations on the North Saskatchewan River between Devon and Fort Saskatchewan (Court 1993). It has been documented that recovering populations return to historical nesting locations before establishing new territories (Cade *et al.* 1988). The exception occurs when historical nesting and foraging habitats have been altered (i.e. due to urbanization or the erection of multi-story buildings and conversion of foraging habitat to agriculture) which has occurred in the proximity of most historical nest locations in and around Edmonton. As a

result of the creation of preferable nesting structures (tall buildings) and the recovery of southern Alberta peregrine populations, peregrines began nesting in Edmonton in 1981. Since the initial occurrence of nesting peregrines in downtown Edmonton, the number of urban territorial peregrine pairs has risen to a total of six in 2001.

As a component of the ongoing monitoring of peregrines in the Northeast Region [1] of Alberta, SRD provided funding through the Species at Risk Program in 2001 to monitor occupancy and productivity of the Fort Chipewyan study area and the population of peregrines in the Edmonton area. Specific objectives for 2001 were to:

1. Determine occupancy of the Fort Chipewyan study area and Edmonton area nest sites,
2. Determine breeding success and productivity of all nesting pairs, and
3. Band young peregrines for future identification.

[1]For the purpose of this report, Northeast Region refers to Alberta Government, Sustainable Resource Development regions. See www.gov.ab.ca/env/regions.html for boundaries.

2.0 METHODS

Terminology relating to the occupancy and productivity of peregrines was taken from Murphy (1990; Table 1).

Table 1. Survey and monitoring terminology and definitions (after Murphy 1990).

Term	Definition
Occupied Nest or Territory	• A nest site or territory that is occupied by at least one territorial adult during some part of the breeding season.
Breeding Pair	• A pair that laid at least one egg during the breeding season.
Productive Pair	• A pair that successfully raised at least one chick to an advanced stage of development from which the chick was assumed to have fledged. Chicks that reached an age suitable for banding are considered to be of advanced age.
Historical Nest Site	• Site that was documented to have been occupied by breeding adults prior to the decline of the peregrine falcon population in southern Alberta, as identified by Court (1993 a).
Known Nest Site	• Site that has been documented to have been occupied by breeding adults in any prior year (includes historic sites plus new sites that have been occupied since the 1970s).

The Fort Chipewyan peregrine population has been annually monitored since 1971 (Court 1994). A component of this monitoring was the documentation of all known nesting territories. A total of 14 different nesting territories have been identified within

the study area. Within a particular nesting territory, alternate nesting locations have been used, but two alternate nest sites within the same territory have never been used in the same year. All nesting territories within the Fort Chipewyan study area can be accessed by boat and all territories were visited were visited a minimum of three times to determine occupancy and breeding productivity. Site visits occurred between 11 May and 11 July 2001. Staff from WBNP and CWS conducted initial visits and second visits and the third site visits were conducted by staff from SRD, WBNP and the Alberta Conservation Association (ACA). Following the each site visit, data regarding occupancy, productivity and band information were entered into a database, which is maintained by WBNP. Nest site occupancy, productivity and banding information was also entered into the Biodiversity/Species Observation Database (BSOD), which is maintained by Alberta Fish and Wildlife Division.

Figure 1. Fort Chipewyan study area. Spectrum Digital Imaging, Courtenay, BC, 2001.

During the third visit, young peregrines were banded with a United States Fish and Wildlife (USFWS) aluminum band on the right leg (applied with pliers) and a colored (black) alpha-numeric band on the left leg (applied with rivets). The orientation of the alpha-numeric symbols were recorded as either horizontal (H) or vertical (V) and whether a line (-) separated the symbols. All banding was conducted under an Alberta Environment collection licence (015 CN) and research permit (3989 GP).

Site visits in the Edmonton area occurred between 19 March and 17 September 2001. All sites were regularly monitored throughout the breeding season to determine occupancy and breeding success. Monitoring was conducted by staff from SRD, ACA and the

public. To minimize disturbance, monitoring was conducted using a 20-60x Bausch and Lomb Elite ® spotting scope. At times it was necessary to disturb adults to determine nesting chronology, when this occurred, the observer quickly left the area to a distance that no longer agitated the adults. Young peregrines were banded using the methods described above and all information was also entered into BSOD. Any nests that contained less than four natural young were considered for fostering of captive-raised young if ages were compatible. Fostering captive-raised young augments natural productivity that increases the overall number of young entering a population.

3.0 RESULTS

3.1. Northeastern Alberta

During the 2001-breeding season there were eleven occupied territories in the Fort Chipewyan study area. One territory (Potato Island) was occupied by a single adult male, the remaining sites were all occupied by territorial pairs (Table 2). Of the ten sites occupied by territorial pairs, eight sites were successful at breeding and four sites successfully raised young (Table 2). The estimated total number of young produced in the Fort Chipewyan study was twelve. During the third visit, both adults aggressively defended the nesting site, indicating the presence of young. By assigning the average brood size (n=3) of the remaining productive sites, a total of twelve young were produced. A total of nine young were banded at three sites during 2001 (Table 3). Young were not counted or banded at Shelter Point due to the mechanical breakdown of the boat and the inability to access the site.

Table 2 Occupied territories, nesting success and productivity of peregrine falcons in the Fort Chipewyan study area of Northeastern Alberta, 2001.

Site Name	Breeding Pair	Productive Pair	# of Fledged Young
Pine Island	Yes	Yes	3
Potato Island	No[1]	No	0
Halfway Island	No	No	0
Point Basse	Yes	No	0
Shelter Point	Yes	Yes	(3 *[2])
Close Call	Yes	No	0
Dog Head	Yes	No	0
Unnamed Island	Yes	No	0
Pushup Lake	No	No	0
Grouse Cape	Yes	Yes	2
Wood Island	Yes	Yes	4

[1] Territory occupied by a single adult male.

[*2] Young were not counted, the average clutch size was applied to this nest site.

Table 3. Summary of peregrine falcon young banded in the Fort Chipewyan study area, 2001.

Site Name	Alpha-numeric	USFWS	Comments
Grouse Cape	B C/R (VH)	816-34585	Male
	B L/R (VH)	1807-78687	Female
Pine Island	B K/S (VH)	1807-78735	Female
	B W/S (VH)	1807-78720	Female
	B C/S (VH)	816-34529	Male
Wood Island	B K/R (VH)	816-34524	Male
	B V/S (VH)	816-34531	Male
	B P/S (VH)	1807-78698	Female
	B U/S (VH)	1807-78719	Female

3.2. Edmonton Area

During the 2001-breeding season, six occupied territories were identified in the Edmonton area (Table 4). Territorial pairs occupied all sites throughout the breeding season, except at the Clinical Sciences site, where there were two adult females and one adult male occupied this site. Four of the six sites were successful in breeding and laid at least one egg, with three sites producing young to fledging age. A total of 16 young were raised to an advanced age and were assumed to have fledged. Of the 16 young, seven young were captive-raised and fostered into four sites (Table 4). All of the 16 young were banded with USFWS and alpha-numeric bands and two of these young were found dead following fledging (Table 5).

Table 4. Occupied territories, nesting success and productivity of peregrine falcons in the Edmonton area, 2001.

Site Name	Breeding Pair	Productive Pair	# of Fledged Young
Inland Cement	Yes	Yes	4 *(1)
Downtown-Telus	Yes	Yes	4 *(1)
Clinical Sciences	Yes	No	4 *(4)
Weber Centre	No	No	0
Esso Plant	No	No	0
Agrium	Yes	Yes	4 *(1)

* ( ) indicates the number of captive-raised foster young

Table 5. Summary of peregrine falcon young banded in the Edmonton area

Site Name	Young (C)	Young (Al)	Comments
Inland Cement	B KX (VH)	987-29817	Female-found dead
	B A/X (VH)	987-29818	Female
	B 2/H (HV)	816-34145	Male
	R HN (VV)	987-29819	Female- foster young
Downtown	B U/9 (HV)	1807-78657	Female
	B 0/Z (VV)	1807-78658	Female
	B 0/Y (VV)	816-34173	Male
	R 9A6 (VVV)	1807-78659	Female-foster young
Clinical Sciences	R 29 (VV)	987-29826	Male-foster young
	R 28 (VV)	816-34182	Male- foster young
	R K/E (VV)	1807-78680	Female- foster young
	R KC (VV)	1807-78664	Female- foster young
Fort Sask. (Agrium)	B S/X (VH)	987-29816	Female
	B R/X (VH)	987-29810	Female
	B P/W (VH)	816-16794	Male
	R 5S (HV)	816-34122	Female- foster, found dead

4.0 DISCUSSION

4.1. Northeastern Alberta

The number of occupied territories in the Fort Chipewyan study area has increased significantly since annual monitoring began in 1971. In 1973, there was only one occupied territory, and has increased to a high in 2000, when twelve territories were occupied (Figure 1). However, the rate of increase has slowed since 1995, with occupancy fluctuating between nine and twelve territories annually. Before the first intensive survey that occurred for peregrines in Northeastern Alberta in 1970 (Cade and Fyfe 1970), populations had already declined, therefore, a true historical population estimate is unknown. Determining when the population stabilizes and reaches carrying capacity can only be determined through a standard monitoring program. Recovery planning is dependent upon the availability of long-term population trend data.

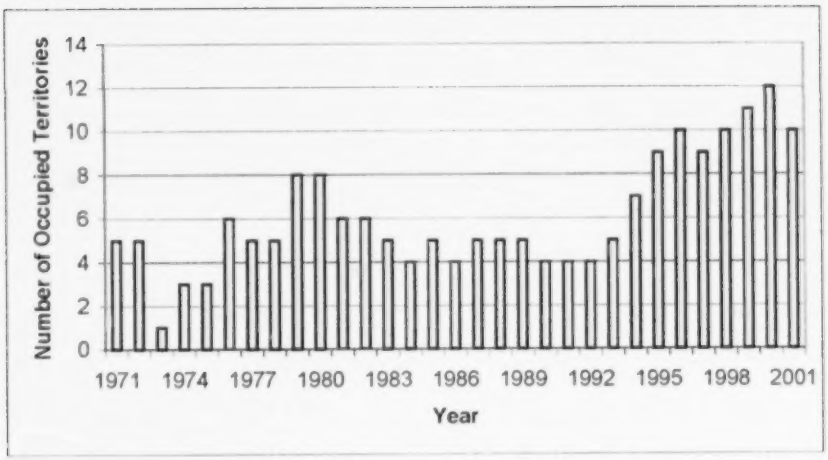

Figure 2. Territory occupancy in Fort Chipewyan Study Area; 1971-2001 (Alberta Fisheries and Wildlife unpublished data, Wood Buffalo National Park and Northeastern Alberta Peregrine Falcon Monitoring 2001, unpublished data).

Annual production of young has been highly variable in the Fort Chipewyan study area. Production of young has fluctuated from zero (1973, 1975, 1976, 1981, 1982 and 1986) to a high of 22, in 1997 (Figure 2). Since 1995, production has remained at over twelve young produced annually, except in 2000, when only four young produced. In 2001, an estimated twelve young were produced, which is below the average for 1995-2001 of fourteen. Although the occupancy rate has appeared to stabilize since 1995, productivity remains variable. Ongoing monitoring of productivity will allow managers to determine if a downward trend in reproductive success is developing in the Fort Chipewyan study area. Being able to compare occupancy and productivity of the Fort Chipewyan study area against Fort Smith and Peace Point will enable managers to determine if trends that are developing are regional in scope or confined to a much smaller area.

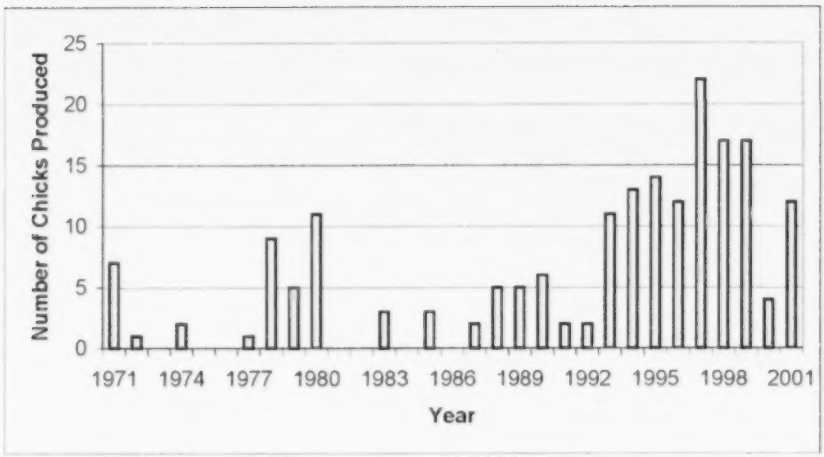

Figure 3. Annual chick production in the Fort Chipewyan study area; 1971-2001. (Alberta Fisheries and Wildlife unpublished data, Wood Buffalo National Park and Northeastern Alberta Peregrine Falcon Monitoring 2001, unpublished data).

4.2. Edmonton Area

Within the Edmonton area there were twelve known peregrine falcon historical nesting locations on the North Saskatchewan River and its tributaries between Devon and Fort Saskatchewan (Court 1993). Recovering populations of peregrines have shown a propensity to return to historical sites during subsequent recovery periods (Cade and Fyfe 1970, Court 1993). None of the historical nesting locations within the Edmonton area have been re-occupied during the recovery of peregrines in Alberta. The absence of territorial pairs can be attributed to a variety of factors. Many of the historical nesting sites are now unsuitable for nesting peregrines. The cliffs have slumped, vegetation has encroached and urban development has occurred on top of numerous cliffs. High-quality foraging habitat has been lost in rural areas due the conversion of habitat to agriculture. In addition to historical nesting habitat becoming unsuitable, new high quality nest sites have been developed (buildings) in the Edmonton area. Tall urban buildings provide high "cliff-like" structures, relatively free from natural predators with abundant prey, which may make urban buildings, preferred nesting sites.

Following the extirpation of peregrines in southern Alberta by 1975 (Fyfe *et al.* 1976), the first peregrines to successfully breed in southern Alberta occurred in 1981, in downtown Edmonton. Peregrines continued to nest in Southern Alberta urban centres exclusively until 1991, when they were first documented in central Alberta (Stepnisky 1996). The 2000 Provincial Peregrine Falcon Survey found that 14 of 23 known nesting locations in southern Alberta were in urban centres or on man-made structures (Corrigan 2000). This indicates that peregrines continue to have a preference for urban and man-made environments over historical rural nesting locations. A new territorial pair of peregrines was observed in 2001 at the Imperial Oil refinery, which indicates that

peregrines will continue to choose urban environments over historical nesting sites. It is unlikely that peregrines will return to historical nesting locations in the Edmonton area.

The number of occupied territories in Edmonton during the 2001-breeding season was six, which is the highest number since peregrines began nesting in Edmonton in 1981 (Figure 3). Four of the six pairs were successful breeders, and three sites fledged a total of nine natural born young. In addition, seven captive-raised young were also fledged through fostering. Young were fostered at the four sites that were successful breeders and laid eggs. The total number of fledged young for the 2001-breeding season in Edmonton was 16, and represents the greatest number of young produced in the Edmonton area (Figure 4).

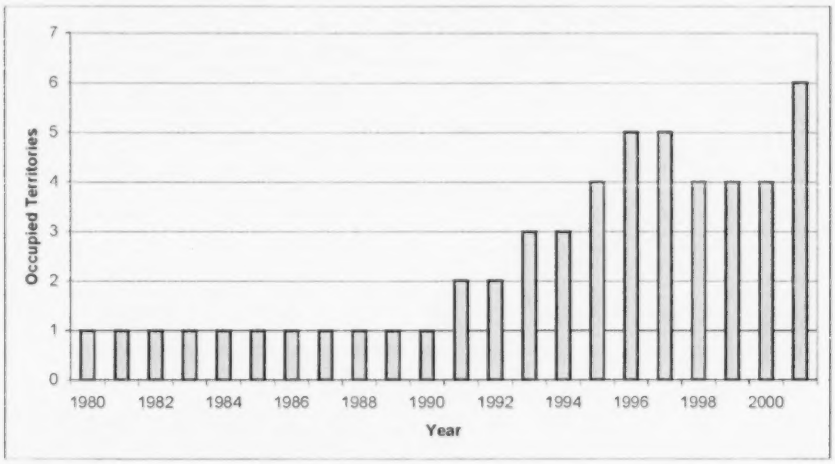

Figure 4. Territory occupancy in the Edmonton area; 1981-2001 (Alberta Fisheries and Wildlife unpublished data).

At the Clinical Sciences site, two adult females and one adult male occupied and actively defended the site throughout the breeding season. Seven eggs were laid and incubated by both females during the breeding season, but all the eggs were infertile and collected for pesticide analysis. Four captive-raised young were successfully fledged from this site, and all three adults were observed participating in feeding and rearing of the young. In the Edmonton area two young were found dead following fledging, one natural born female young at the Inland Cement site and one female foster young at the Fort Saskatchewan (Agrium) site.

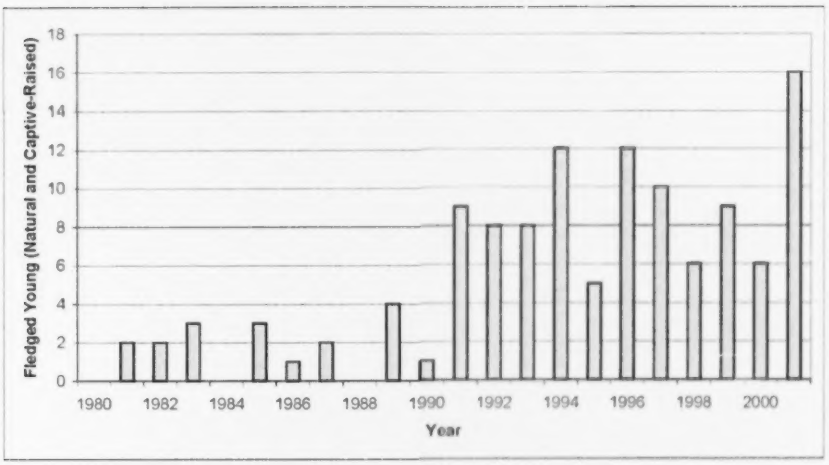

Figure 5. Annual chick production in the Edmonton area; 1981-2001 (Alberta Fisheries and Wildlife unpublished data).

5.0 MANAGEMENT IMPLICATIONS AND FUTURE DIRECTIONS

Currently, the peregrine falcon is listed as a "threatened" species, both provincially and nationally (ESCC 2000, COSEWIC 2000). It is unknown whether peregrine population provincially is approaching historical population levels because there are no accurate pre-decline population estimates. In order to determine that peregrines are approaching carrying capacity, ongoing annual monitoring is needed. Productivity in peregrine populations has a high degree of variability and relying on five-year provincial surveys will not provide accurate information of occupancy and productivity trends. Standardized annual monitoring of specific populations will provide biologists and managers the necessary information to determine when peregrines are reaching carrying capacity. This information can also provide an early warning should populations and/or productivity decline. A co-operative effort between SRD, WBNP and CWS should continue in Northeastern Alberta in the three established study areas. A formal Memorandum of Understanding (MOU) outlining agency responsibility needs to be developed that would remain in effect through the 2005 national peregrine falcon survey.

Annual monitoring in the Edmonton area should also continue under the direction of SRD. Monitoring in Edmonton can be done relatively easily with no additional allocation of resources. In sites where peregrines show a territorial affinity, suitable nesting structures should be erected (i.e. Weber Centre). Providing a nesting structure greatly increases the likelihood nesting and fledging success. The peregrine falcons in Edmonton have provided an exceptional opportunity for public education and awareness, and continue to do so. In addition to annual monitoring, an effort should be made to facilitate the compilation, storage and management of peregrine falcon population and biological data. Banding of young should continue if an effort is to be made in the future to identify territorial peregrines. This will enable mangers to determine the

demographics of the recovering population. Satellite transmitters may be used to monitor juvenile dispersal and assist in determining the linkages between nesting and foraging habitat.

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